

Chesapeake Bay Maryland (CBM) NERR Water Quality Metadata
April 2001-November 2001
Latest Update: April 11, 2003

I. Data Set and Research Descriptors

1. Principle investigator(s) and contact persons:

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2. Entry verification

The data are uploaded to a PC from the YSI 6000/6600 UPG data logger and graphs are produced and quickly examined using the PC6000 software. Data files are then exported from the PC6000 format into Excel (for Windows 98) files where the headers, footers, and inappropriate spaces are removed. Plots of the data are made and suspect data (outliers) are dealt with accordingly. Removed data points and missing data are replaced with a periods (.). Edited files are merged to contain one full month for each data logger. Data is then QA/QC'd using the cdmomac(ro)3.xls macros and Appendix B., YSI 6000 Data Review and Editing Protocol. The CDMO cdmomac3.xls macro will allow the user to automatically format column widths to the correct number of decimal places based on YSI sensor specifications. It also allows the user to QA/QC each data logger generated file for missing data points, fill all cells that do not contain data with periods, and find all data points that fall outside the range of what the data logger is designed to measure (outliers). The CDMO import.xls macro will allow PC users with 30-minute data to automatically create a monthly Excel file from a two-week deployment and insert periods for missing data. In addition, in

November 1999 a graphing capability was added to this macro allowing users to produce single parameter and missing data point graphs on a monthly basis. Marta Ceroni and Pamela Behm were both responsible for the collection and QA/QC procedures for this data.

3. Research Objectives

The purpose of the monitoring program at CBM NERR is to conform to the NERR SWMP monitoring program looking at trends in water quality over both temporal and spatial scales. A difference in how marshes can change water quality is being studied by comparing a marsh creek site to a river channel site. Measurements are taken every 30 minutes over a 5-14 day period at both the Patuxent River Park (PR) and Jug Bay Wetlands Sanctuary (JB) sites.

4. Research methods (YSI data loggers)

Three to four data loggers (2 YSI 6000 sondes/2 YSI 6600 sondes) were rotated throughout the data collection period. One YSI 6000 sonde was removed from rotation on 8/24/01 due to internal errors that caused the sonde to malfunction.

Patuxent River: Each YSI data logger is laid down on a 4" diameter PVC pipe that has been cut in half. The PVC is nailed to a 4"x 4" block of wood which is secured to a crab pot. The crab pot with the data logger in it sits on the bottom at both sites. The crab pot is locked to a pier. The YSI probes sit approximately 6" above the sediment.

Jug Bay: The same type of cage as PR (converted crab pot) was used from 4/27 - 9/03. Due to deterioration of the crab pot, a new cage was installed temporarily 9/03. The temporary cage was constructed of a wooden frame with galvanized steel netting wrapped around the frame (dimensions: approximately 40" L x 10" H x 12" W). The data logger was laid down on a 4" diameter PVC pipe that was cut in half. The PVC was nailed to a 4"x 4" block of wood and placed in the bottom of the cage. The final cage was installed 10/19/01. This cage was a converted raccoon trapping cage (32" L x 12.25" H x 10" W) in which the data

logger was suspended horizontally in a galvanized metal pipe approximately 15.3" in length and 4" in diameter. The pipe was held suspended about 5" from the bottom of the cage by 4 cables. The cage was stabilized in the water column by attaching a 5-pound weight at each end of the bottom of the cage. The cage is locked to a pier. The YSI probes sit approximately 7" above the sediment.

Every 30 minutes up to a two-week period, measurements for specific conductivity, salinity, percent saturation, dissolved oxygen, pH, temperature, turbidity and water level are recorded. Within 14 days of deployment, the data is downloaded and either newly calibrated probes are installed or a new YSI unit with calibrated probes are placed at each site. Calibration procedures are carried out according to the methods described in the YSI Operating Manual.

5. Site location and character

The Chesapeake Bay Maryland NERR has three components in Maryland's portion of Chesapeake Bay. Monie Bay is a mesohaline region on the lower Eastern Shore; Otter Point Creek is a tidal freshwater river and marsh system; and Jug Bay is part of the freshwater portion of the Patuxent River. Both data loggers are within the Jug Bay component.

Patuxent River Park (PR) - (38 deg 46' 23.5"N/76 deg 42' 32.5"W) Site PR is located in the upper tidal headwaters of the Patuxent River, Maryland. PR is along the mainstem of the Patuxent River, which is approximately 50m wide at this point along the river. The PR site sits adjacent to a boat launch at Jackson Landing, located on the Prince Georges County side of the river at Patuxent River Park. The actual sonde is deployed horizontally in a retro-fitted crab pot and sits roughly .25m off the bottom sediments. Sediments at the site are extremely fine and easily resuspended. Average depth at this site is roughly 2 meters. Salinities at this site rarely exceed 1ppt. Because this site is located along the main channel of the Patuxent River, water quality at this site represents the general quality of water flowing along the main portion of the river. The

Patuxent River watershed is an increasingly urbanized watershed, however there are extensive riparian buffers along the portion of the river that flows through the site. However, the PR site is approximately 3km downstream of a large wastewater treatment plant that discharges directly into the Western Branch tributary of the Patuxent River. The PR site is roughly 1.5km downstream of the confluence of the Western Branch tributary and the Patuxent River mainstem. The tidal range at this site is roughly 0.5m.

Jug Bay (JB) - (38 deg 46' 5"N/76 deg 42' 28"W estimated) Site JB is located in a shallow tidal creek adjacent to the Patuxent River. The site is slightly upstream (roughly 0.3km) from the PR site but sits in shallow creek that is tidally infiltrated by a backwater marsh adjacent to the Patuxent River mainstem. At low tide, this backwater marsh becomes a large mud flat with very little standing water. The creek ranges in width between 2m to 5m at the site and average depth at the site is 0.75m. Because of the shallow nature of this site, the sonde is periodically exposed at very low tides. Sediments at this site are extremely fine and flocculant. The sonde is deployed horizontally in a retro-fitted cage, similar to site PR. Because of the shallowness of the tidal creek, coupled with the dramatic daily changes in the depth and width of the stream, deployments at this site have presented some problems. These problems include periodic exposure of the sonde, very high turbidity and sedimentation rates associated with tidal infiltration and resuspension, which have caused severe fouling of the probes at this site. Water quality at the site represents extreme shallow water habitats. Thus it is not uncommon to see very large fluctuations in temperature and dissolved oxygen at this site ranging from complete anoxia to full saturation, due in part to the shallow nature of the site and the effects of marsh processes on water quality. Salinities at this site rarely exceed 1 ppt. Tidal range at this site is roughly 0.5m

6. Data collection period

Data loggers initiated collection in April 2001 and continued through the end of

November 2001, at Jug Bay Wetlands Sanctuary (JB) and Patuxent River Park (PR).

Sondes were deployed from April through November 2001 due to concerns with ice

cover that prohibited deployment during the winter months. The time of deployment and retrieval was not documented in the field, therefore only dates

are given for those instances when the time was unknown.

Data logger deployments:

Jug Bay 2001:

Deployment	Retrieval
04/27 19:00	05/09 11:00
05/09 12:00	05/21
05/21	06/04
06/04	06/15
06/15	06/28
06/28	07/10
07/10	07/23
07/23	08/02 15:00
08/02 17:00	08/14
08/14	08/24
08/24	09/06 13:30
09/06 14:30	09/19 15:00
09/19 16:00	10/03
10/03	10/19
10/19	10/31
10/31	11/15
11/15	12/01

Patuxent River 2001:

Deployment	Retrieval
04/27 07:00	05/09
05/09	05/21
05/21	06/04 12:00
06/04 13:00	06/14
06/14	06/28 12:30
06/28 14:00	07/11
07/11	07/23
07/23	08/02
08/02	08/14
08/14	08/24
08/24	09/05
09/05	09/19 13:00
09/19 14:00	10/03 14:00
10/03 16:30	10/19
10/19	10/31
10/31	11/15 12:00
11/15 13:30	12/01

7. Distribution

According to the Ocean and Coastal Resource Management Data Dissemination Policy
for the NERRS System-wide Monitoring Program,

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from the NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see section 1. Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under general information link on CDMO homepage) and online at the CDMO homepage <http://cdmo.baruch.sc.edu>. Data are available in text tab-delimited format, Microsoft Excel spreadsheet format and comma-delimited format.

8. Associated researchers and projects

The Jug Bay Wetlands Sanctuary staff have been collecting weekly to monthly temperature, salinity, dissolved oxygen, and nutrient samples at the same location as the data logger at JB.

II. Physical Structure Descriptors

9. Variable sequence, range of measurements, units, resolution, and accuracy:

YSI 6000/6600 datalogger

Variable	Range of Measurements	Resolution	
Accuracy			
Date	1-12, 1-31, 00-99 (Mo,Day,Yr)	1 mo, 1 day, 1 yr	NA
Time	0-24, 0-60, 0-60 (Hr,Min,Sec)	1 hr, 1 min, 1 s	NA
Temp	-5 to 45 (c)	0.01 C	+/-
0.15C			
Sp COND	0-100 (mS/cm)	0.01mS/cm	+/-0.5%
Of			
reading + 0.001mS/Cm			
Salinity	0-70 Parts per thousand (ppt)	0.01 ppt	+/- 1%
of			
Reading or 0.1 ppt, (whichever is greater)			
DO	0-200 (% air saturation)	0.1% @air sat	+/-2%
@air			
Saturation			
DO	200-500 (% air saturation	0.1% @ air sat	+/- 6%
@			
Saturation			
DO	0-20 (mg/l)	0.01 mg/l	+/-
0.2mg/l			
DO	20-50 (mg/l)	0.01 mg/l	+/-
0.6mg/l			
Depth (shallow)	0-9.1 (m)	0.001m	+/-
0.018m			
PH	2-14 units	0.01 units	+/-
0.2units			
Turb	0-1000 NTU	0.1 NTU	+/- 5%
of			
Reading or 2 NTU (whichever is greater)			

Data columns are separated by tabs. Each file contains a two line column header at the top of the page which identifies measurements and units for each column.

10. Coded variable indicator and variable code definitions

Site definitions: PR = Patuxent River Park; JB = Jug Bay Wetlands Sanctuary

11. Data anomalies:

Note: Turbidity data is incomplete and suspect for both PR and JB. A new YSI

6600 data logger, complete with turbidity probe, was put in rotation on 8/02/01.

This was the only turbidity probe in rotation between JB and PR. There was no turbidity probe installed at either site prior to this date. However,

calibration procedures for this probe were unclear and technicians were not trained on the proper usage of this probe (i.e. a clear beaker was used for calibration). As such, all turbidity data is suspect. All obvious turbidity outliers were removed, as reported below in section 12.

JB:

January

No data collected entire month.

February

No data collected entire month.

March

No data collected entire month.

April

Data collection began 4/27/01 at 19:00.

May

No data 5/2/01 18:00-18:30 as sonde failed to take reading.

No data 5/3/01 16:30-18:00 as sonde failed to take reading.

No data 5/3/01 19:00 as sonde failed to take reading.

No data 5/4/01 18:30-19:00 as sonde failed to take reading.

No data 5/5/01 16:00-16:30 as sonde failed to take reading.

No data 5/9/01 11:30 due to calibration and maintenance.

June

No data 6/10/2001 16:00 - 6/15/01 12:30 because sonde reached internal memory capacity.

No data 6/28/2001 23:30 - 6/29/01 0:00 as sonde failed to take reading.

No data 6/29/01 13:30-14:00 as sonde failed to take reading.

No data 6/29/01 19:30 as sonde failed to take reading.

No data 6/30/01 3:00 as sonde failed to take reading.

No data 6/30/01 11:30-13:00 as sonde failed to take reading.

No data 6/30/01 15:00-18:30 as sonde failed to take reading.

No DO data 6/28/01 14:00 - 6/30/01 23:30 due to DO probe malfunction

July

No DO data 7/1/01 0:00 - 7/11/01 14:00 due to DO probe malfunction

No data 7/1/01 13:00-16:30 as sonde failed to take reading.

No data 7/1/01 17:30-19:00 as sonde failed to take reading.

No data 7/4/01 17:30-19:30 as sonde failed to take reading.

No data 7/5/01 15:30-19:30 as sonde failed to take reading.

No data 7/6/01 18:00 as sonde failed to take reading.

No data 7/7/01 17:00 as sonde failed to take reading.

No data 7/7/01 18:00-18:30 as sonde failed to take reading.

No data 7/9/01 22:00-23:00 as sonde failed to take reading.

No data 7/23/01 17:00-22:00 as sonde failed to take reading.

No data 7/23/01 23:00 - 7/24/01 0:30 as sonde failed to take reading.

No data 7/24/01 18:00 - 7/25/01 0:00 as sonde failed to take reading.

No data 7/25/01 1:30-2:30 as sonde failed to take reading.
No data 7/25/01 17:30-23:30 as sonde failed to take reading.
No data 7/26/01 1:00-1:30 as sonde failed to take reading.

August

No data 8/2/01 15:30-16:30 due to calibration and maintenance.

Turbidity outlier data removed:

Date	Time	Turbidity (NTU)
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08/07/2001	12:30	1141
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08/07/2001	14:30	1135
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08/07/2001	23:00	1391
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08/07/2001	23:30	1464
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08/08/2001	0:30	1091
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08/08/2001	1:00	1194
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08/08/2001	1:30	1451
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08/08/2001	8:30	1458
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08/08/2001	16:30	1470
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08/08/2001	18:30	1471
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08/08/2001	20:30	1481
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08/08/2001	23:00	1467
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08/09/2001	0:30	1400
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08/09/2001	1:00	1181
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08/09/2001	1:30	1460
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08/09/2001	2:00	1339
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08/09/2001	2:30	1136
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08/09/2001	3:00	1084
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08/09/2001	20:30	1217
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08/10/2001	6:30	1345
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08/10/2001	19:00	1465
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08/11/2001	14:00	1466
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08/11/2001	14:30	1466
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08/11/2001	15:00	1469
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08/11/2001	15:30	1470
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08/11/2001	16:00	1471
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08/11/2001	16:30	1470
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08/11/2001	17:00	1469
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08/11/2001	17:30	1468
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08/11/2001	18:00	1465
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08/11/2001	18:30	1465
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08/11/2001	19:00	1460
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08/11/2001	19:30	1455
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08/11/2001	20:00	1453
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08/11/2001	20:30	1453
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08/11/2001	21:00	1455
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08/11/2001	21:30	1457
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08/11/2001	23:00	1118
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08/12/2001	13:30	1189
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08/12/2001	19:00	1444
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08/12/2001	19:30	1443
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08/12/2001	23:00	1450
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08/13/2001	3:30	1250
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08/13/2001	4:00	1439
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08/13/2001	4:30	1438
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08/13/2001	5:00	1437
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08/13/2001	5:30	1437
08/13/2001	6:00	1437
08/13/2001	6:30	1437
08/13/2001	7:00	1429
08/13/2001	7:30	1407
08/13/2001	8:00	1437
08/13/2001	8:30	1438
08/13/2001	9:00	1440
08/13/2001	9:30	1443
08/13/2001	10:00	1444
08/13/2001	10:30	1444
08/13/2001	11:00	1445
08/13/2001	11:30	1446
08/13/2001	12:00	1446
08/13/2001	12:30	1446
08/13/2001	13:00	1446
08/13/2001	13:30	1446
08/13/2001	14:00	1445
08/13/2001	14:30	1446
08/13/2001	15:00	1447
08/13/2001	21:00	1445
08/13/2001	21:30	1439
08/13/2001	22:00	1443
08/13/2001	22:30	1389
08/13/2001	23:30	1444
08/14/2001	0:00	1445
08/14/2001	0:30	1445
08/14/2001	1:00	1445
08/14/2001	1:30	1442
08/14/2001	2:00	1440
08/14/2001	2:30	1438
08/14/2001	3:00	1437
08/14/2001	3:30	1437
08/14/2001	4:00	1435
08/14/2001	4:30	1434
08/14/2001	5:00	1432
08/14/2001	5:30	1431
08/14/2001	6:00	1431
08/14/2001	6:30	1431
08/14/2001	7:00	1431
08/14/2001	7:30	1431
08/14/2001	8:00	1431
08/14/2001	8:30	1431
08/14/2001	9:00	1431
08/14/2001	9:30	1433
08/14/2001	10:00	1436
08/14/2001	10:30	1443
08/14/2001	11:00	1447
08/14/2001	11:30	1449
08/28/2001	3:30	1497

No turbidity probe available 08/14/01 12:00 through 08/24/01 12:30.
DO data suspect 08/11/01 01:00 through 08/14/01 11:30 due to possible
fouling of
probe.

pH data for deployment 08/14/01 12:00 through 08/24/01 13:00 suspect due to possible calibration error.

September

No data 9/6/01 14:00 due to calibration and maintenance.

No data 9/19/01 15:30 due to calibration and maintenance.

Turbidity outlier data removed:

Date	Time	Turbidity (NTU)
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09/04/2001	2:30	1074
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09/04/2001	6:00	1359
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09/04/2001	7:30	1158
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09/04/2001	8:00	1318
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09/04/2001	17:30	1507
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09/04/2001	18:00	1506
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09/04/2001	21:00	1503
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09/04/2001	22:30	1502
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09/04/2001	23:00	1500
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09/05/2001	0:00	1497
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09/05/2001	1:00	1493
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09/05/2001	8:30	1040
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09/05/2001	9:00	1175
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09/05/2001	9:30	1345
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09/05/2001	10:00	1480
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09/05/2001	10:30	1421
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09/05/2001	11:00	1484
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09/05/2001	11:30	1485
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09/05/2001	12:00	1487
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09/05/2001	12:30	1490
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09/05/2001	19:00	1509
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09/05/2001	19:30	1507
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09/05/2001	20:00	1507
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DO mg/L and DO % deleted 09/05/01 22:30 - 09/06/01 13:30 due to possible exposure prior to redeployment of sonde.

pH data for deployment 09/19/01 16:00 - 10/03/01 14:30 was deleted due to deployment of bad pH probe.

October

pH data for deployment 09/19/01 16:00 - 10/03/01 14:30 was deleted due to deployment of bad pH probe.

November

No missing data.

December

No data collected entire month.

PR:

January

No data collected entire month.

February

No data collected entire month.

March

No data collected entire month.

April

Data collection began 4/27/01 at 7:00.

May

All data deleted 05/09 14:00 through 05/10 05:00 due to exposure of sonde at low tide.

June

No data 6/4/01 12:30 due to calibration and maintenance.
No data 6/14/01 15:00-21:30 as sonde failed to take reading.
No data 6/14/01 22:30-23:30 as sonde failed to take reading.
No data 6/28/01 13:00-13:30 due to calibration and maintenance.

July

No data 7/23/01 11:30-15:00 as sonde failed to take reading.

August

No data 8/2/01 0:00-0:30 as sonde failed to take reading.
No data 8/2/01 1:30-2:00 as sonde failed to take reading.
No data 8/2/01 4:30-15:30 as sonde failed to take reading.
No data 8/14/01 13:30 - 8/24/01 14:00 due to sonde malfunction (internal failure).

September

No data 9/19/01 13:30 due to calibration and maintenance.
Turbidity outlier data removed:

Date	Time	Turbidity (NTU)
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09/20/01	1:00	1414
09/20/01	11:30	1414
09/21/01	4:00	1412
09/21/01	12:00	1415
09/22/01	15:00	1418
09/22/01	20:30	1275
09/23/01	12:00	1422
09/23/01	20:00	1427
09/23/01	21:30	1427
09/24/01	18:00	1425
09/25/01	19:00	1123
09/25/01	20:30	1414
09/25/01	21:30	1337
09/26/01	2:00	1415
09/26/01	7:00	1042
09/26/01	11:30	1403
09/26/01	16:00	1404
09/26/01	16:30	1284

09/26/01	17:00	1405
09/26/01	23:30	1405
09/27/01	1:00	1405
09/27/01	1:30	1406
09/27/01	2:00	1086
09/27/01	2:30	1406
09/27/01	6:00	1365
09/27/01	7:00	1400
09/27/01	7:30	1400
09/27/01	8:00	1399
09/27/01	8:30	1398
09/27/01	9:00	1398
09/27/01	15:00	1404
09/27/01	17:00	1404
09/27/01	23:30	1092
09/28/01	11:30	1398
09/28/01	12:00	1399
09/28/01	12:30	1397
09/28/01	13:30	1366
09/28/01	17:00	1398
09/28/01	18:00	1399
09/30/01	7:30	1392

October

No data 10/3/01 14:30-16:00 due to calibration and maintenance.

Turbidity outlier data removed:

Date	Time	Turbidity (NTU)
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10/01/01	2:00	1388
10/01/01	2:30	1388
10/02/01	3:00	1388
10/03/01	8:00	1395
10/22/01	18:30	1457
10/23/01	6:00	1452
10/29/01	19:00	1430
10/29/01	19:30	1292
10/29/01	20:30	1150
10/29/01	21:00	1229
10/29/01	21:30	1277
10/29/01	22:00	1405
10/29/01	22:30	1422
10/29/01	23:00	1372
10/29/01	23:30	1417

November

No data 11/15/01 12:30-13:00 due to calibration and maintenance.

Turbidity outlier data removed:

Date	Time	Turbidity (NTU)
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11/30/01	20:30	1391
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December

No data collected entire month.

12. Missing data:

Missing data are denoted by a period in the data set. Data are missing due to equipment failure where no probes deployed, maintenance/calibration of equipment, elimination of obvious outliers, or elimination of data due to calibration (both pre and post) problems. Outliers were removed throughout the 2001 time period and are believed to be the result of internal data logger error. For more details on deleted data, see the Anomalous Data Section (11.). To find out more details about missing data, contact the Research Coordinator at the site submitting the data.

13. Post deployment information

Calibration was not performed during post deployment because this procedure was not included in training of research technicians. Therefore, technicians were not aware of or trained for post deployment calibration.

14. Other Remarks/notes